

# **SEN-003**

**REVERSE**

**PARKING**

**SENSOR**

**INSTALLATION**

**INSTRUCTIONS**

# SEN-003 REVERSE PARKING AID

## INSTALLATION INSTRUCTIONS

**It is essential that these instructions are read thoroughly prior to installation. Check limitations, considerations & disclaimer.**



Complete kit.

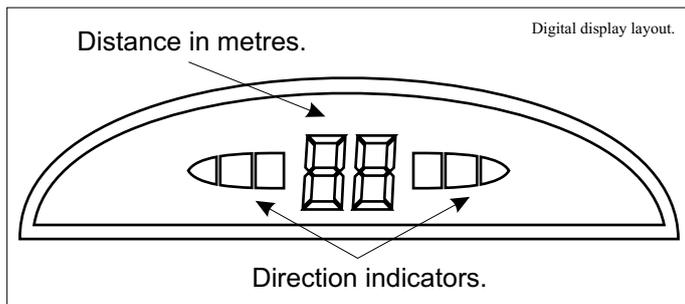
Congratulations on choosing the SEN-003 Reverse Parking Aid for your vehicle. With correct installation the sensor will provide years of trouble-free reverse parking.

The sensor works by bouncing calibrated sound waves off obstacles behind the vehicle. A digital display and beeper informs the driver how close the rear bumper is to impact.

To avoid distracting the driver while driving forwards, the SEN-003 is active only when reverse gear is engaged.

### DIGITAL DISPLAY

The digital display shows the approximate distance between the rear bumper and the obstacle (in metres). From a maximum distance of 2.0 metres down to 0.3 metres.



The display also shows two direction indicators which will tell the driver whether the obstacle is located to the left, right or middle of the rear bumper. More bars in each indicator light up as the obstacle becomes closer. The peizo buzzer inside the digital display provides the audible feedback from the sensors. As the distance reduces, the beeps from the buzzer become more intense.

Distance	Beeps	Bars
2.0 - 1.0	1	1
0.9 - 0.6	2	2
0.5 - 0.4	3	3
0.3 - 0.0	Constant	3

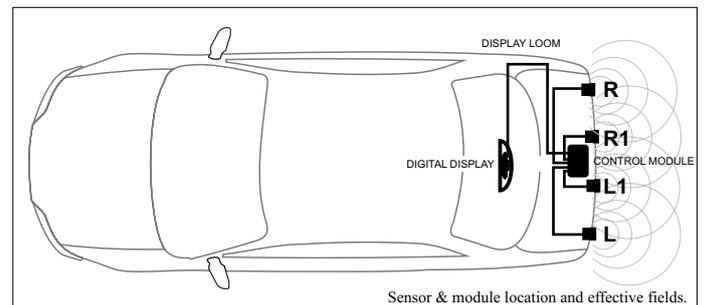
### Digital display mounting

The exact location for mounting the digital display will vary across all vehicles. Follow these rules for best result: -

- Must be visible to driver.
- Must not be in direct sunlight - excessive heat will warp the plastic and destroy the electronics.
- Must be kept totally moisture free and mostly dust free.

The display comes with double sided tape; remove the backing and stick firmly to mounting location. Ensure the surface is free of oil, dust and moisture before applying.

The digital display data cable is long enough to



traverse most passenger vehicles. The suggested display location is in the middle of the rear parcel shelf. The numbers displayed will appear reversed when looking through the rear view mirror. It is recommended for optimum safety considerations that the driver is looking to the rear as reversing and thus views the display located on the rear parcel shelf.

The display data cable plugs into the control module via the "DS" socket.

### Front mounting digital display

Mounting the display at the front of the cabin may be necessary in vehicles without rear parcel shelves (station wagons, pickup trucks, 4WD's and alike). It is still recommended that the driver faces backwards while reversing.

### CONTROL MODULE

The SEN-003 control module generates the electronic signals used by the sensor heads. The module has a socket for each of the four sensors, one socket for power and a socket for the digital display to plug in. The control module can be mounted in the boot (near reverse light power circuit).

The SEN-003 will provide much better coverage with four heads rather than only two heads are used. All heads must be plugged in and operational.

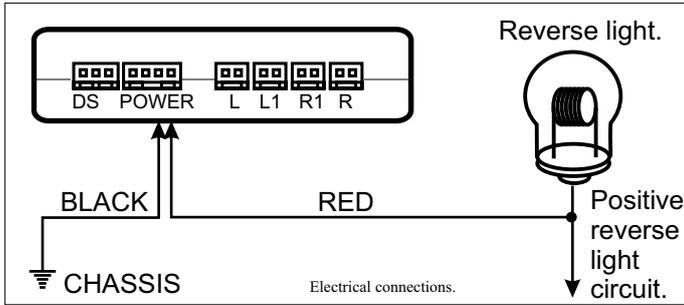
### Control module mounting

The control module should be mounted inside the boot in a location where it will not suffer water or dust ingressions. Ensure any luggage placed in the boot cannot knock against the control module.

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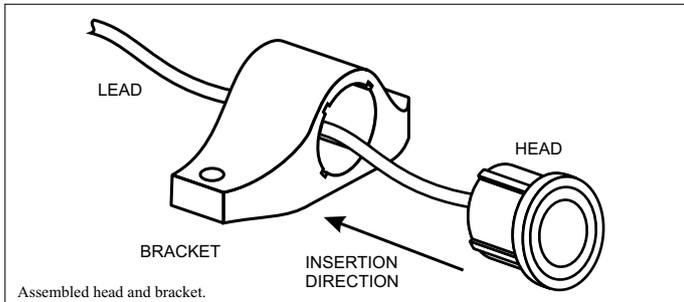
## ULTRASONIC SENSORS



The SEN-003 is supplied with four sensors which produce the ultrasonic sound waves that measure the distance to obstacles.

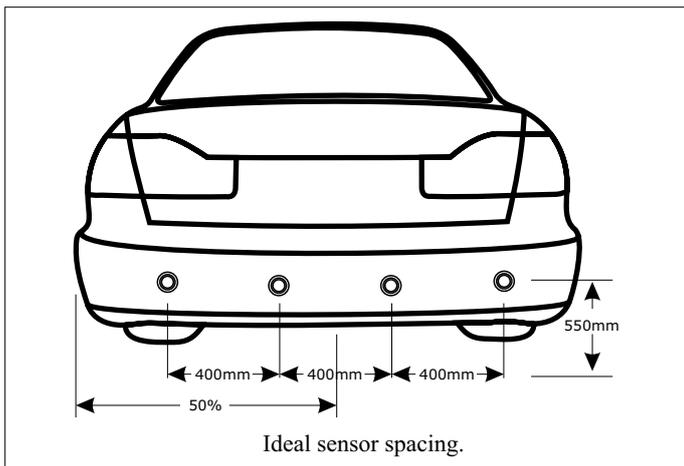
All sensors are supplied as ready for flush mounting. If the vehicle only suits a bracket mount installation, the sensors may be fitted to the brackets supplied. Ensure the key on the sensors line up with keyway in the bracket.

### Sensor separation distances



The coverage by the ultrasonic fields is determined by the spacing of the sensors. Mount the array of sensors centrally, with no less than 300mm and no more than 600mm between each sensor.

Caution should be paid to the position of the outer



sensors. If the sensors are too far from the corner point of the bumper, an obstacle that may only just hit the car may not be detected.

The optimum height of each sensor is around 550mm from the ground. This specification is flexible, but performance will suffer if the distance is exceeded too much. See "Sensor Head Positioning and Considerations" section and the diagrams on the last page for outline on possible installation problems.

### Sensor head plug-in order

The outer sensors plug into the control module via the "R" and "L" sockets. The inner sensors plug in via the "R1" and "L1" sockets.

### Two heads only

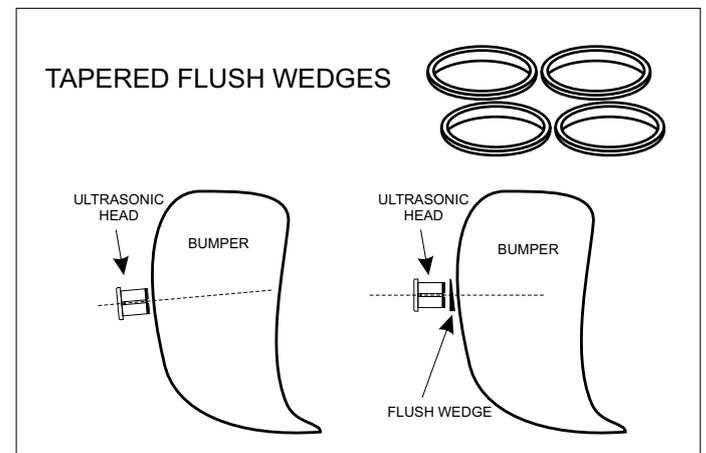
If using the system with only 2 heads, please use L & R, or L1 & R1 and space the sensors at 1/3 distance in from the edge of the bumper.

### Flush mount drilling

When flush mounting the sensors it is critical to ensure there is enough clearance behind the bumper. Each sensor will require a 21.5mm hole with 50mm of free space. When drilling holes, **always** select a drill bit smaller than the sensor head. Then carefully expand the hole with a file to accommodate the head.

The SEN-003 kit provides 4 tapered flush wedges to adjust the angle of the heads when fitted flush in the bumper. The wedges may be used to correct the angle of the sensor heads on the X or Y axis (or part of both).

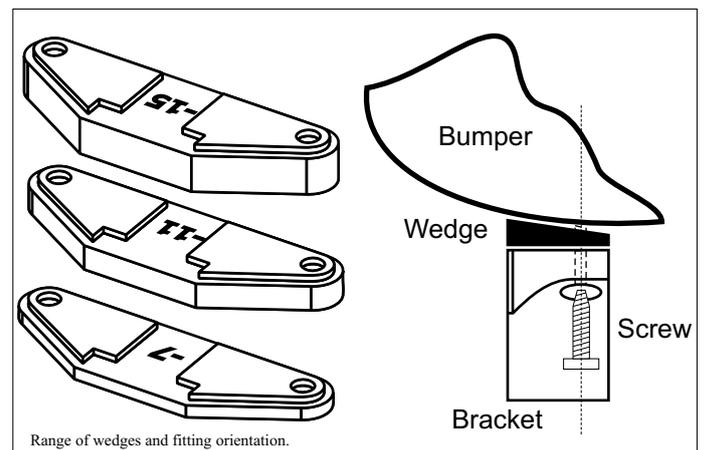
### Bracket mount drilling



When mounting the sensors with the brackets supplied, a suitable location is required to allow fitting flush and below the bumper. If the bumper profile angle is radically off line, the kit comes with mounting wedges. The wedges come in the different offset angles - 7degrees, 11 degrees & 15 degrees.

Each wedge will correct the angle of the bracket as needed. Multiple wedges may be used on each head, only if another mounting location cannot be found.

**IMPORTANT** - Ensure heads are not impeded by rear



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mounted spare tyre (4WD's) nor tow bar position.

### **Painting considerations**

When matching sensor head and bumper colour avoid applying excessive paint. Combined layers of primas, under coats and top coats that are too thick on/across the active parts of the heads will "muffle" the output and reduce (if not completely defeat) the effectiveness of the sensor.

Recommended paint procedure:

- Remove the shine of the sensor heads by rubbing with very fine wet/dry sanding paper. Ensure all moisture is removed before continuing.



- An excellent way to mask the cables and back of the sensors is to drill holes in the box in which the SEN-003 was supplied. Insert the cables through the holes and push the heads in

snug.

- Use a Prepwash™ equivalent to remove all oil and dust which may have built up during handling.
- Apply a plastic adhesion promoter to bond the next paint layer with the plastic body.
- Metal flake paints will require a ground coat of paint to cover the black plastic.
- Apply the final colour to the heads.

To locate the correct colour paint (and ground coat if necessary) contact your local paint supplier, many are able to make up a pressure pack with the correct colour simply by supplying them with the paint code detailed usually under the bonnet.

Always read the application and safety directions on the paint cans at each stage. The manufacturers know how to achieve the best results with their products.

### **Running sensor cable into vehicle**

Once the sensors are mounted, the cables will need to enter the boot through a common opening. If an opening is not available, a hole must be drilled in a hidden location. Any bare metal must be sealed with a rust inhibiting compound. A grommet must be used to avoid chafing through the cable insulation. Then use water resistant sealant to prevent water and fumes from travelling through any vacant space in the grommet. All cables running across the vehicle must be securely fastened with cable ties.

## **SENSOR HEAD POSITIONING & CONSIDERATIONS**

### **Bumper curvature/shape**

When choosing the optimum location for the sensor heads, consideration must be placed on the curvature, angle and overhang of the bumper. The performance

of the sensors will be bias towards the direction they are pointing i.e. if the bumper face slopes towards the ground, the performance of the sensors will be bias towards the ground. Tow bars, 4WD protection bars / steps, number plate surrounds, 4WD spare wheels and sectional mouldings may impede the ability of the sensor to function, as they may be detected as obstacles.

When selecting a suitable position for the sensor heads consideration should also be given to ensure the sensor head sits flush in the bumper i.e. the bumper shape may curve / angle to such a degree that the lip of the sensor head overhangs and will :

- Look unsightly.
- Allow water behind the sensor.
- The sensor to move and become misaligned.

### **Sensor head height**

The optimum height from the ground for sensor heads position is between 500 and 650mm, this is not always suitable for all vehicles due to bumper shape, curvature, lamp locations, bumper overhang or internal protection framework behind the bumper. The parameters of sensor head height should never be lower than 400mm and no higher than 700mm. Performance may be affected towards the lower and higher limits of the measurements stated.

### **Trial run**

Before drilling, use double side tape to fix the sensor heads to the proposed locations and test their effectiveness. Once a satisfactory setup is achieved, mark the locations and continue the installation.

### **Sensors too low or angled down**

Sensor heads positioned close to the lower limit may be susceptible to reporting alerts caused by dipping driveway entrances / exits, gradients, plants and bushes.

### **Sensors too high or angled up**

Likewise sensor heads positioned closer to the higher limit are more likely to fail to detect low obstacles i.e. pipes, car park rail guards or mini walls.

### **Vehicle's load weight**

The height and/or angle of the bumper changes as the vehicle weight changes, consider this when measuring marking dimensions for sensor head location,

i.e. a 20kg spare wheel is removed for installation purposes, the bumper height may lift by 5 - 10mm.

The performance of the parking aid may be affected by adding weight to the vehicle. As the vehicle is loaded, the parking aid sensors head direction may change.

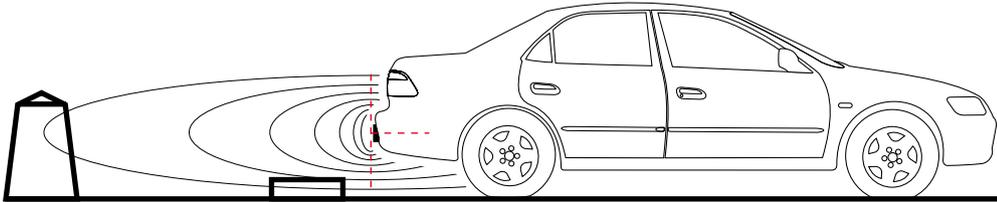
### **Trailers**

The parking aid can not make measurements when the a trailer is attached to the vehicle. The trailer is constantly detected as the closest obstacle.

## SYSTEM LIMITATIONS AND DISCLAIMER

- The SEN-003 reverse parking aid should never be used as a complete replacement for visual reverse parking. Any feedback should be used on an advisory level.
- The manufacturer accepts no responsibility nor liability for damage to any vehicle, property or other, caused directly or indirectly through the use of this product.

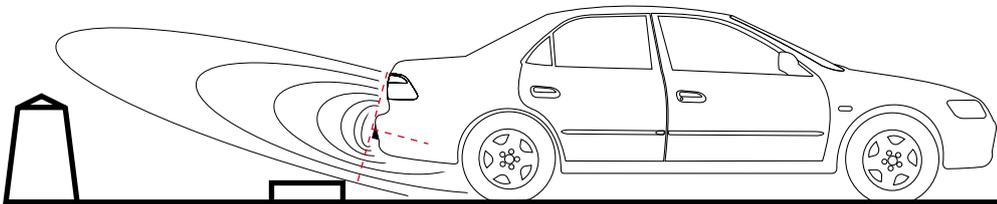
## SENSOR HEAD MOUNTING IS CRITICAL



"Perfect, field is directed straight out missing road surface."



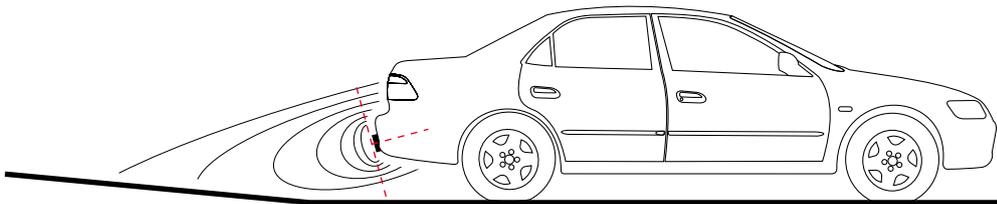
PERFECT



"Heads are angled up, sensor may miss low objects and delay the detection of all objects."



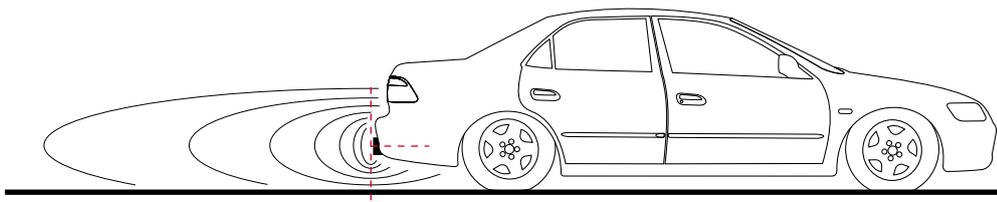
ANGLED UP



"Heads are angled down, sensor may detect subtle changes in road surface."



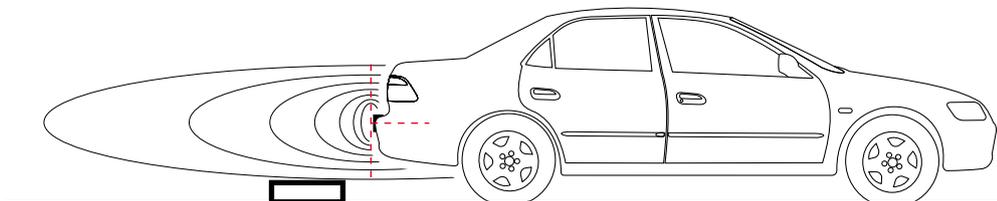
ANGLED DOWN



"Heads are mounted too low, sensor may pick up slight changes in road surface."



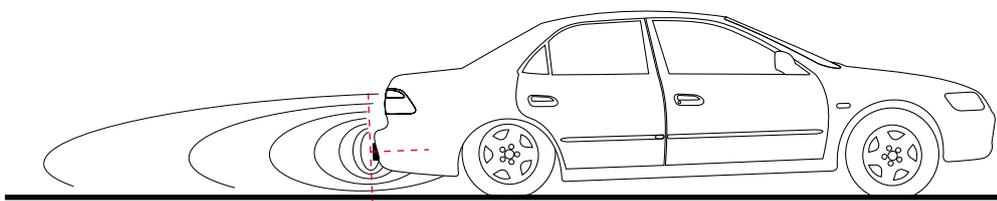
TOO LOW



"Heads mounted too high, sensor may miss all low objects."



TOO HIGH



"Loaded car may angle perfectly mounted heads towards the ground."



LOADED CAR

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# TYPICAL INSTALLATION



1. Mask rear bumper both below and above approximate sensor locations. This will help with marking and reduce scratching the bumper.



6. Mark the heights of all the sensors. The VX Commodore bumper is least curved at 510mm from the floor.



2. Check behind bumper to ensure sensor heads will have enough clearance and cables can be fixed to anchor points.



7. Cross your fingers, close your eyes and drill four 21.5mm holds in your wife's bumper!!!! (don't close your eyes). Stop often to remove swarf from drill bit to avoid scratching.



3. Temporarily mount each sensor head in it's approximate position using tape. Notice the centre heads have been spread further to allow the ultrasonic field to miss the tow bar.



8. When all holes are drilled, remove masking tape and insert heads into each hole. Secure all cables inside bumper.



4. Temporarily wire up all connections and test coverage by moving firm object in and out of the field. Sensors should respond only when object is within the car profile.



9. Drill access hole in a high point to avoid road debris in rear of car. Apply zinc based anti-rust paint. Insert rubber grommet to avoid chafing cables.



5. When satisfied with results, measure and separate heads with greater accuracy. This car has a 300,600,300 split between the heads (aligned central to tow bar).



10. Fit controller module inside right or left bulkhead (ensure water can not reach module). Connect power to reverse light wires. Mount display module and plug in. Happy parking.

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# TYPICAL COLOUR MATCHING/APPLICATION



1. To mash the sensor heads, drill two holes in cardboard box that the sensors are supplied in. Use the hole saw supplied.



6. Apply FLEXI-PRIME plastic adhesion promoter. Two light coats are preferred to one thick coat \*\*\*. Leave in dust free location to dry.



2. Insert the sensor head cables through the box top and push into place.



7. Apply lacquer ground coat if required - many metallic paint colours require this extra coat to cover the heads' black colour. eg GMH F146 needs a "Golden Honey" ground coat.



3. The box will stop the over spray from contaminating the sensor cables and plugs.



8. Apply coat(s) of bumper colour. Many thin coats are preferred to one thick coat.



4. Use a very (very) fine grade of wet and dry abrasive paper to remove the shine of the heads.



9. Leave in a dust free location to dry between coats.



5. Use PREPWASH to remove any grease, oil & dust. Ensure the clean surface is not touched again until after the painting procedure is complete. Solvent fluid must be enamel compatible.



10. Ingredients  
 1. Prepwash  
 2. Primer coat(s)  
 3. Ground coat(s)  
 4. Final coat(s)

When completely dried/hardened, insert into vehicle bumper.

\*\*\* Follow paint manufacturer's safety and application instructions for best result.

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